

About half a litre of the mixed gases was now passed through the apparatus, submitting them to the action of the electricity. The contents of the two bulbs were next transferred to two test-tubes; and after adding excess of potash to each, Nessler's test was applied. The first solution gave a faint yellow coloration, the second a rather thick reddish-brown precipitate.

No attempt was made to estimate the quantity of ammonia formed, as it would vary with many of the conditions of the experiment.

Since writing the account of the above experiment, which was made in Dr. Odling's laboratory at Oxford on March 24, I have seen in the 'Comptes Rendus' for April 22, 1873, a note of an experiment by Messrs. Thénard of Paris, in which they observe the formation of traces of ammonia by the action of electricity on a mixture of hydrogen and nitrogen; but no details of the mode of operating are given.

III. "On the Effect of Pressure on the Character of the Spectra of Gases." By C. H. STEARN and G. H. LEE. Communicated by W. HUGGINS, F.R.S. Received March 19, 1873.

The variations in the spectra of gases which accompany changes of density have been studied by Plücker and Hittorf, Frankland and Lockyer, Wüllner and others.

It appears to us that one cause to which these changes may be due has been overlooked, and that many of the observed variations are entirely independent of the density of the gas. If a Leyden jar be placed in the circuit, and the current from an induction-coil be passed through a Plücker's tube containing nitrogen with the traces of hydrogen generally present, the following well-known phenomena are observed.

When the gas is near atmospheric pressure, the line-spectrum of nitrogen is brilliant, and the F line of hydrogen is broad and nebulous. As the pressure is reduced, the lines of nitrogen gradually fade out, and the band-spectrum appears, while at the same time the F line of hydrogen becomes narrow and well defined. If fresh gas be admitted, the line-spectrum reappears, accompanied by a widening of the F line.

That these changes are not dependent on the density of the gas, appears from the following experiment:—

A sealed tube containing nitrogen, with traces of hydrogen at a pressure of about 2 millims., was placed before the spectroscope. A second tube was connected with the air-pump, and the current passed through both tubes, a Leyden jar being placed in the circuit.

When the pressure in the second tube was high, the line-spectrum of nitrogen appeared brilliantly in the sealed tube, and the F line was broad and nebulous; as the exhaustion proceeded these lines faded out, and the F line became narrow, in precisely the same manner as if the sealed tube had been in process of exhaustion. The explanation appears to be that

the production of the line-spectrum of nitrogen, and the expansion of the F line of hydrogen, depend entirely on the intensity of the charge communicated to the Leyden jar. When the pressure of the gas between the electrodes is high, the discharge does not take place until the jar is fully charged; but as the exhaustion proceeds a less and less charge is communicated to the jar, and the discharge at last is virtually not more than that of the simple current.

The same effect may be produced by interposing a break in the circuit, the length of which may be increased as the pressure in the tube is reduced. Plücker and Hittorf appear to have used a break, as in their paper in the *Philosophical Transactions*, Nov. 1864, they speak of the expansion of lines obtained by increasing the charge of the jar by an interposed stratum of air. They do not, however, appear to have noticed that the reduction of pressure in the tube was only equivalent to a diminution of the charge of the jar, and that to this cause many of the changes of spectra which accompany the reduced pressure ought to be ascribed.

We are continuing our experiments on the effect of temperature on the spectrum, but prefer to reserve this portion of the subject for the present.

May 8, 1873.

FRANCIS SIBSON, M.D., Vice-President, in the Chair.

The following communications were read:—

- I. "The Action of Light on the Electrical Resistance of Selenium." By Lieut. SALE, R.E. Communicated by J. N. LOCKYER, F.R.S. Received March 28, 1873.

It having been recently brought to notice that selenium in the crystalline condition exhibits the remarkable property of having a conductivity varying with the degree of light to which it is exposed, the following experiments were undertaken with a view to the further elucidation of the matter:—

Experiment 1.—A bar of crystalline selenium measuring approximately $1.5'' \times .5'' \times .05''$ was procured, and platinum wire terminals were fastened to the ends.

The bar itself was then enclosed in a box having a draw-lid, so as to admit or exclude the light at pleasure.

Then, the lid of the box being on, the resistance of the selenium was measured by means of a high-resistance galvanometer and a Wheatstone's bridge, with dial-coils capable of measuring up to 10,000,000 ohms. The battery-power was 2 cells Daniell.

The measurement was made on a dull cloudy day, and in a room of equable temperature.

The resistance having been carefully balanced, the lid of the box was withdrawn, when the resistance of the selenium fell instantaneously and